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(54) Title: **VIDEO GAME SYSTEM**

(57) Abstract: A computer-implemented method of communicating gaming data. The method includes receiving game software at a game console from a server, executing the game software at the game console to enable game play, and generating billing information at the game console in response to game play.

## VIDEO GAME SYSTEM

### CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Serial No. 09/614,846, filed July 12, 2000.

### BACKGROUND OF THE INVENTION

Computer game software is often distributed to a user on a fixed media, such as read-only memory (ROM) cartridge, a CD-ROM, or other fixed memory media. Game software used for home gaming systems typically has a high purchase cost, but may be used on an unlimited use basis. This purchase model is advantageous where a consumer anticipates playing a game frequently. However, where the consumer has less interest in a particular game, or anticipates infrequent use, the consumer may forego the purchase of the game. As a result, the game manufacturer receives no revenue and the consumer may obtain less use of his or her game console. In the case of arcade (i.e., commercial) gaming systems, game consoles may have a fixed software program that cannot easily be changed. As a gaming console ages, and its game software falls out of favor, revenue from that game console may decline. Enabling the game console software to be easily changed would be advantageous. Consequently new means of distributing game software are desired.

### SUMMARY OF THE INVENTION

In general, in one aspect, the invention features a computer-implemented method of communicating gaming data. The method includes receiving game software at a game console from a server, executing the game software at the game console to enable game play, and generating billing information at the game console in response to game play.

Implementations may include one or more of the following features. Received game software can be stored (permanently or temporarily) in a memory at the game console. The game software received from the server can include code that configures the game console to perform processing such as receiving player input and rendering output images, or can include a digital certificate or other "key" code to enable software resident at the game console to be executed. Billing information can be generated at the start of a game, as game features (e.g., skill levels) are accessed during game play, and at other times. A game console may offer multiple different games that are user-selectable, and the available games may be determined based on a usage pattern tracked at the server. Usage patterns, as well as other data, can be maintained in a player profile that is stored at the server and updated in

response to game play. The player profiles can be accessed from one or more game consoles that are connected to the game server. In a commercial game console implementation, the video game console may include a coin or bill collector, a credit or debit card reader, or other device to receive a monetary payment (e.g., a token, a coin, a monetary note, debit account information, or credit account).  
5

Implementations may include one or more of the following advantages. A video game architecture may provide automated downloading of game software from a central software repository, thereby facilitating purchase and distribution of game software. The downloaded game software may be received at a game server on a trial-bases (i.e., with particular features disabled or accessible for a limited number of plays), a player may thereafter make a payment to receive a fully or permanently enabled version of the game software. Improvements in game software licensing can be achieved by allowing a manufacturer to implement per-use charges and to vary licensing charges.  
10

The details of one or more embodiments of the invention are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the invention will be apparent from the description and drawings, and from the claims.  
15

#### DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a networked game system.  
Fig. 2 is a block diagram of a game console.  
20 Fig. 3 is a block diagram of a game server.  
Figs. 4A and 4B are flowcharts showing exemplary game console and game server operations.  
Fig. 5 is an information flow diagram.  
Figs. 6A and 6B are flowcharts of game unit purchase and resale operations.

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#### DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 shows a networked game system 100 that includes video game consoles 111-113 and game server 130. The game consoles and game server each include a data network interface that lets the game consoles and game server exchange data over a network 150. In the system 100, game software can be downloaded from the game server to the game consoles to update features of the game consoles and to configure the game consoles to play new games. In addition, the game consoles and game server can exchange billing, game usage, player statistical data, and other types of data. Data sent from the game consoles to the  
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game server can be used to bill for game usage, to track player skill levels and achievements, to record statistics, and for other purposes. In some implementations, the game consoles also may directly exchange data with each other through the network 150 or may indirectly exchange data using data relay services provided by the game server 130 or other network equipment. Data exchanged between the game consoles may be used, among other things, to play and synchronize multi-player games.

Fig. 2 shows a block diagram of a game console 200. The game console 200 may be a consumer video game consoles (such as a Sony Playstation®, Nintendo 64® or a Sega Dreamcast® video game consoles), a personal computers, a coin-operated game (such as amusement center video game machine), or other software-controlled gaming devices. The game console includes a joystick, keyboard, mouse and/or other input device 210 coupled to a processing unit 200. The processing unit 200 includes a software controlled processor and its associated support circuitry (such as RAM memory, hard disk data storage, and/or ROM memory) 201, a video display controller 202, and a network interface 203. The network interface 203 may be a modem, digital subscriber line interface, wireless network interface, local area network interface, or other device allowing data to be transmitted and received on the network 150

Fig. 3 shows a block diagram of a game server 130. The game server 130 includes a network interface 301, a processing server 302, a database 303. Components 301-304 may be implemented using industry-standard computer hardware and software and may be implemented as components of a single computer or may be distributed among one or more servers. For example, the processing server 302 may be a computer executing a Microsoft Windows NT®, SUN Solaris®, LINUX, or other UNIX-based operating system, and the database 303 may consist of files stored on that server's hard disk drive. All or part of the database 303 also can be distributed on separate database servers and systems. For example, the database 303 may reside at a server executing relational database management software and/or at a web server that returns data in response to hypertext transfer protocol (HTTP) requests. Database 303 can store data and software programs that can be sent (downloaded) to the game consoles 111-113, and can also store statistical data, game, and player information received from the game consoles.

Implementations of the system 100 can provide, among other things, on-demand and/or periodic distribution of game software to game consoles, game usage billing, game access control, and player information storage and distribution. Fig. 4A is a flow chart showing operation of an implementation of a game console and Fig. 4B is a flow chart

showing operation of an implementation of a game server. The operations shown in Figs. 4A and 4B include player identification, game access control, distribution of software, management of billing information, and storing player statistics. Fig. 5 is a data flow diagram showing exchange of data between a game console and a game server during the operation shown in Figs. 4A and 4B. It is noted that in different implementations of the system 100, the operations shown in Figs. 4A and 4B may be augmented, performed in a different order, and/or one or more of the operations may be eliminated. For example, an implementation may eliminate player identification 401 and storage of player statistics. An exemplary operation of the system 100 will now be described.

Referring to Figs. 4A, 4B and 5, operation of a game console and game server can include initialization stages 401, 460-462 in which the game console and server exchange data needed for the operation of the game console. Initialization may begin with an initialization request message 501 sent from the game console to the game server (step 401). The initialization request message may include game console identification (ID) information that describes capabilities of the game console. As an example, the game console ID can include one or more codes that identify the game console manufacturer, model, processing capabilities, available controller types 210, resident software versions, and other capabilities. The game server receives the initialization message (step 451) and may processes the message using an initialization routine 460-462 that includes querying database 303 to retrieve console initialization data (step 460), performing initial processing on that data (step 461) and returning response data (step 462) in a message 502 to the game console. The data in the message 502 can include a listing of games available for download from the server, game console configuration parameters, software, and/or other data.

After the game console has been initialized 401, the game console may execute a customization routine 402-404 whereby the operation of the game console is customized for a particular player. This player-specific customization may include customizing game operation, controlling access to different games, storing and retrieving data and statistics, retrieving list of frequently or recently played games, enabling resumption of an interrupted game, and/or other personalized operations. The customization routine begins with the entry of a player identifier (ID) using an input device 210 (step 402). The player identifier 402 may be a login name and password, a set of initials, an account code, or other data identifying a particular player. In some implementations, the player ID may be stored on a bar coded, magnetic stripe, or other data storage card and entered into the console using a card reader.

For example, an arcade could distribute "frequent customer" cards storing player IDs to its customers.

After receiving the player ID, the game console sends a player data request message 503 containing a player ID to the game server (step 403). The game server uses parameters in the request message (e.g., the player ID) to query the database 303 and retrieve player-specific configuration information (step 480). The player-specific configuration information may include player statistics, a list of games available to the player, a list of restricted games, game status information, permission levels, and game software. The server returns the player-specific configuration information in a response message 504 sent to the game console (steps 481). The response message 504 is then processed at the game console (step 404) to configure the game console for the player. Configuration (step 404) may include, e.g., determining and displaying games available to the player, customizing game options, and allowing game play to continue from a previous point.

Some game consoles can be used to play different types of games. In such game consoles, a listing of the available games may be presented to the player, and the desired game selected using an input device 210 (step 405). The available games may be determined from the console initialization data 502, from player-specific configuration information 504 received by the game console, and/or from a list of game identifiers stored at the console. The player-specific information 504 may enumerate the available games and/or may contain data used to determine a subset of available games that the particular player is permitted to access. The information 504 may include access control data that modifies a list of games returned in the console initialization data 502. Modification of the list of games may include blocking categories of games, such as violent games.

After the desired game or game option has been selected (step 405), the game console may perform a software download process (step 406) to obtain needed software from the game server. The download process (step 406) includes sending a request message 507 to the game server to request the needed software. In response, the server retrieves the software from its database 303 and sends it in a message 508 to the game console (steps 451, 475-476). Software downloaded to the game console may be stored in persistent memory (e.g., on a hard disk drive) for future access. In such cases, the game console may perform a check of its local storage space prior to downloading. In some implementations, available game software may have been previously stored at the game console (e.g., at game console manufacturing time) and, rather than actual software code being sent in the message 508, the

“software code” may be an authorization code (e.g., a digital certificate) that enables access to the previously stored software.

The game console can then begin game play (step 408). In some implementations, a payment may be collected and/or payment information processed (step 407) prior to game 5 play (step 408). Payment processing (406) may be required where, for example, a charge is associated with downloading of software (step 406). Payment processing (406) may also be required where a payment must be made each time a game is played (a game play payment). The amount of the payment may be variable and may depend on the software downloaded, the game selected, or other factors.

10 Payments can be made by depositing coins or bills into a money collection device at the game console (e.g., an arcade machine’s coin slot or bill collector), or by deducting a payment from an account managed by the game server (a “player’s account”). The player’s account can be implemented using data stored in the database 303 to track payment credits (“game units”) earned or purchased by the player. Each game unit can represent a fixed sum 15 of money (e.g., “25 cents”), a fixed or variable period of game play (e.g., five minutes of play or three levels of game play), or may be an arbitrary value (e.g., “thirty units”). The player may establish the player’s account by inputting information such as the player’s name and a credit card number at an input screen displayed by the game console, using a separate web-based interface to the game server 130, using a phone call to an operator or manager of the 20 system 100, using a card swipe machine (i.e., a smartcard or magnetic stripe card reader), or by other means. The game server 130 can exchange data with a credit processing system 114 in order to process credit card information or other financial information used in establishing the player’s account.

To make a payment using game units in a player’s account, the game console sends a 25 billing message 505 or 509 to the game server from the game console. Billing message 505 may be a message requesting payment prior to a software download (406) and billing message 509 may be a message requesting payment prior to beginning game play (408). A billing message may identify a requested payment (e.g., a number of game units) and a player ID, account ID or other data that can be used to identify the player’s account. The requested 30 payment may differ depending on the software being downloaded or the game selected for play. For example, popular games may require a higher number of game units to play. The game server processes a billing message by querying database 303 to access the player’s account information (step 470), determining whether the requested payment can be made (step 471), deducting the requested payment from the player’s account (step 472), and

sending a payment approval or denial message (504 or 508) to the game console (step 473). The payment approval message may indicate the number of game units that have been approved.

In some implementations, the player's account can be automatically established in the course of playing a game. For example, during game play, a player can accumulate game units by playing a certain number of games, by earning a high score, or by completing certain tasks or demonstrating skill in a game. When the game has ended, a message can be sent to the game server 511 containing a player ID and the number of game units earned. The game server may then automatically check to determine if an account is associated with the player ID and credit that account if one exists, or, if such an account does not exist, the game server can establish a new player's account and credit it with the earned game units. Thereafter, the stored game units can be accessed by the player to play additional games.

Additional payment processing (step 409) may occur during game play (step 408). Payment processing 409 may include periodic messages to deduct game units from the player's account. In a game billed on a duration-of-play basis, payment processing 409 can automatically send messages to deduct additional game units from a player's account after pre-set periods of game play. Payment processing 409 also can occur when special features of a game are accessed. For example, game units may be deducted from a player's account to obtain game hints, to access advanced game levels, to access special game features, or to play a multi-player game with other players (game consoles) connected to the network 150.

After a game has been completed, the game console can send game result data 511 to the game server (step 410). The game result data can include the player's score, time to complete the game, the point at which the game was stopped, the player's rating of the game, and other information. The game result data can be stored (step 485) by the game server and used to customize subsequent operation of the game console, to track the player's skill level, to identify a point at which to resume a game, and/or to track usage patterns. For example, the game server may use usage pattern data to determine new games that a player might be interested in. The player may be advised of such games in the response message 504 sent to the game console as part of the player customization process.

In some implementations, game consoles 111-113 can exchange data with each other as well as with the game server 130 to allow for multi-player games or for games played against an automated opponent. Players may be able to select partners for multi-player games based on the skill levels of the potential partners (which may be determined by result data 511 associated with the potential partners). Statistical information about players may be used

by the game server to determine appropriate player matches for multi-player games. For example, player ranking statistics may be used to automatically pair players for a chess game.

In a commercial implementation, the system 100 can be used to invoice a commercial establishment for use of arcade game machines. For example, an arcade owner may purchase 5 a fixed number of game units from a game console manufacturer or software provider using payment processing features implemented in game consoles 111-113 and the game server 130. These units may be purchased as-needed (i.e., immediately before a game is played) or pre-purchased in bulk. The owner may then re-sell the purchased game units to patrons. Figs. 6A and 6B show processes that can be implemented to allow game unit purchase and 10 reselling. Fig. 6A shows a process whereby game units can be purchased by an establishment and Fig. 6B shows the treatment of those game units when a game is played.

Referring to Fig. 6A, game units can be purchased by initiating (step 601) a game unit loading and purchasing process. The process (601) may be initiated by entering a code at an input device 210, by depressing a hidden switch to initiate the loading and purchasing 15 process, or by other means. The game console can then collect purchasing account information, such as a credit card number or other account identifier (step 602). The purchasing account information is then sent to the game server (step 603). The purchasing account information can be sent in a billing message similar to billing messages 505 and 509. After receiving the account information, the game server allocates game units and sends a 20 response message to the game console indicating the number of game units allocated. The response message can be sent and processed similar to a response messages 506 and 510. Data in the response message can be encrypted and/or digitally signed to prevent forgery or alteration of the response message and the allocated game units value. After receiving the 25 response message (and, if necessary, decrypting it or verifying its digital signature), the game console adds the allocated game units indicated in the response message to any previously allocated, unused game units. The resultant available game units value may be stored in an encrypted form at the game console and the available game units can be re-sold to players. Game units can also be stored at a server. The game server may subsequently send a bill to 30 the owner or may exchange data with a credit processing system 114 to automatically bill the owner.

The available game units at a game console can then be re-sold to players. For example, game units purchased for \$0.15 by an arcade owner may be sold to players for \$0.25. Referring to Fig. 6B, game unit re-sale may be initiated when a player deposits money (step 610) in a game console's coin or bill collector and depresses "start" button on the game

console (step 611). After the "start" button is pressed, the game console determines if there are any available (unused) game units remaining and, if so, deducts from the available game units a number of game units required for play (step 612). The game may then be played by the player (step 613). If game units are unavailable, the game console may display a message 5 indicating that the owner should perform the unit loading and purchasing operation (Fig. 6A).

In some implementations, both consumer-type game consoles and commercial-type game consoles may operate on the same network 150 and may communicate with the same game server 130. Such a system could provide a roaming configuration and payment capability allowing the player customization data, player statistics, and billing information to 10 be used at a variety of machine types and locations.

The data exchanges through network 150 may be transmitted over data exchange systems that include circuit-switched and/or packet-switched technologies. Circuit-switched connection technologies include the use of modems and/or digital subscriber line interfaces to communicate over analog or digital phone connections. Packet-switched connection 15 technologies include the use of packet switching through the Internet, a local area network, or other type of network 150. In some cases, a circuit-switched connection may be used to connect to a modem bank which provides an interface to a packet switching network. Other types of network configurations and data exchange technologies also may be used.

The invention may be implemented in digital electronic circuitry, or in computer 20 hardware, firmware, software, or in combinations of them. Apparatus of the invention may be implemented in a computer program product tangibly embodied in a machine-readable storage device for execution by a programmable processor; and method steps of the invention may be performed by a programmable processor executing a program of instructions to perform functions of the invention by operating on input data and generating output. The 25 invention may advantageously be implemented in one or more computer programs that are executable on a programmable system including at least one programmable processor coupled to receive data and instructions from, and to transmit data and instructions to, a data storage system, at least one input device, and at least one output device. Each computer program may be implemented in a high-level procedural or object-oriented programming language, or in assembly or machine language if desired; and in any case, the language may 30 be a compiled or interpreted language. Suitable processors include, by way of example, both general and special purpose microprocessors. Generally, a processor will receive instructions and data from a read-only memory and/or a random access memory. Storage devices suitable for tangibly embodying computer program instructions and data include all forms of non-

volatile memory, including by way of example semiconductor memory devices, such as EPROM, EEPROM, and flash memory devices; magnetic disks such as internal hard disks and removable disks; magneto-optical disks; DVD-RW, DVD-ROM, CD-RW and CD-ROM disks. Any of the foregoing may be supplemented by, or incorporated in, specially-designed  
5 ASICS (application-specific integrated circuits). Messages exchanged between the game console and game server may use a variety of different protocols. For example, proprietary protocols, TCP/IP, FTP, HTTP, NFS, SMTP and other data transfer protocols may be used in different implementations.

A number of embodiments of the present invention have been described.  
10 Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. For example, gaming devices can include non-video devices. Exemplary non-video gaming devices can include a pinball machine in which a software controlled processor controls the action of bumpers, flippers, targets, and scoring. In such a pinball machine, software can be downloaded from server 130 to make the pinball  
15 game more challenging by changing the score for various targets, or to make the game easier by increasing points awarded for hitting various targets with the pinball. The data messages shown in Fig. 5 may be sent in a different order.

Accordingly, other embodiments are within the scope of the following claims.

**WHAT IS CLAIMED IS:**

1. A computer-implemented method of communicating gaming data comprising:  
receiving game software code at a game console from a server, the game console and  
5 the server being operatively connected by a network;  
processing the game software code at the game console to enable game play; and  
generating billing information at the game console in response to game play.
2. The method of claim 1 further comprising storing the received game software code in  
10 a memory at the game console.
3. The method of claim 1 wherein processing the game software code comprises  
processing software instructions configuring the game console to enable game play by:  
15 receiving player input at an input device;  
rendering an output image in response to the player input; and  
displaying the output image on a video display device.
4. The method of claim 1 wherein generating billing information in response to game  
play comprises generating billing information in response to a request to start a game.  
20
5. The method of claim 1 wherein generating billing information in response to game  
play comprises generating the billing information in response to a game feature accessed  
during game play.
- 25 6. The method of claim 5 wherein the game play feature comprises a skill level  
associated with a game.
7. The method of claim 1 further comprising:  
identifying a plurality of available games;  
30 receiving an input selecting one of the available games;  
and wherein the game software code comprises software implementing the selected  
game.

8. The method of claim 7 further comprising tracking a game usage pattern, and wherein displaying the plurality of available games comprises displaying based on the usage pattern.

9. The method of claim 1 wherein the video game console is a commercial video game  
5 console enabling video game play upon receipt of a monetary payment.

10. The method of claim 9 wherein the monetary payment is selected from the group consisting of a token, a coin, a monetary note, debit account information, and credit account information.

10

11. The method of claim 1 further comprising receiving a payment for a purchase of a unit of game time.

15

12. The method of claim 11 wherein the unit of game time represents a fixed period of game play, the fixed period being dependent on one of a plurality of games selected by a user of the game console.

20

13. The method of claim 1 further comprising:  
permanently storing the downloaded game software code on a storage media at the client computer.

25

14. The method of claim 1 wherein a plurality of other game consoles are operatively connected by the network to the game server and wherein the method further comprises:  
updating a player profile at the server in response to game play at the game console;  
and  
accessing the player profile to configure one of the other game consoles.

30

15. The method of claim 1 wherein the game software code comprises a digital certificate and processing the game software code comprises processing to determine authorization to execute software instructions locally stored at the game console.

16. A gaming system comprising:  
a game server comprising a network interface operatively coupling the server to a plurality of game consoles;

a game database coupled to the game server and comprising a plurality of downloadable games; and  
at memory coupled to the game server and comprising instructions to configure the game server to:  
5 receive a game request from one of the game consoles,  
process the game request to select one of the downloadable games,  
send the selected one of the downloadable games to the one of the game consoles, and  
receive billing information generated at the game console in response to execution of the one of the downloadable games.

10

17. The system of claim 16 wherein each of the downloadable games comprising game console executable software code

18. The system of claim 16 wherein the instructions further comprising instructions to

15 configure the server to:

receive billing information generated at the one of the game consoles during an execution of the one of the games; and  
send an message to authorize a continuation of execution of the one of the games.

20

19. The system of claim 18 wherein the billing information comprises a credit check message and the message to authorize comprises a message indicating a sufficient user credit in an account maintained by the server.

20. The system of claim 16 wherein the game software code comprises software

25 implementing the selected game and the instructions further comprising instructions to configure the server to:

identifying a plurality of available games; and  
receiving an input selecting one of the available games.

30

21. The system of claim 16 wherein the instructions further comprising instructions to configure the server to:

track a game usage pattern and store the game usage pattern in a user profile.

22. The system of claim 16 wherein the instructions further comprising instructions to  
configure the server to:  
receive a game console identifier specifying an execution environment characteristics  
of the one of the game consoles.
- 5
23. The system of claim 22 wherein the execution environment characteristics comprises  
an available memory level.
- 10
24. The system of claim 23 wherein the execution environment characteristic comprises a  
game console software capability identifier.
25. The system of claim 1 wherein a plurality of other game consoles are operatively  
connected by the network to the game server and wherein the method further comprises:  
15 updating a player profile at the server in response to game play at the game console;  
and  
accessing the player profile to configure one of the other game consoles.
26. The system of claim 17 wherein the game software code comprises a digital  
certificate to authorize execution of game software locally stored at a game console.

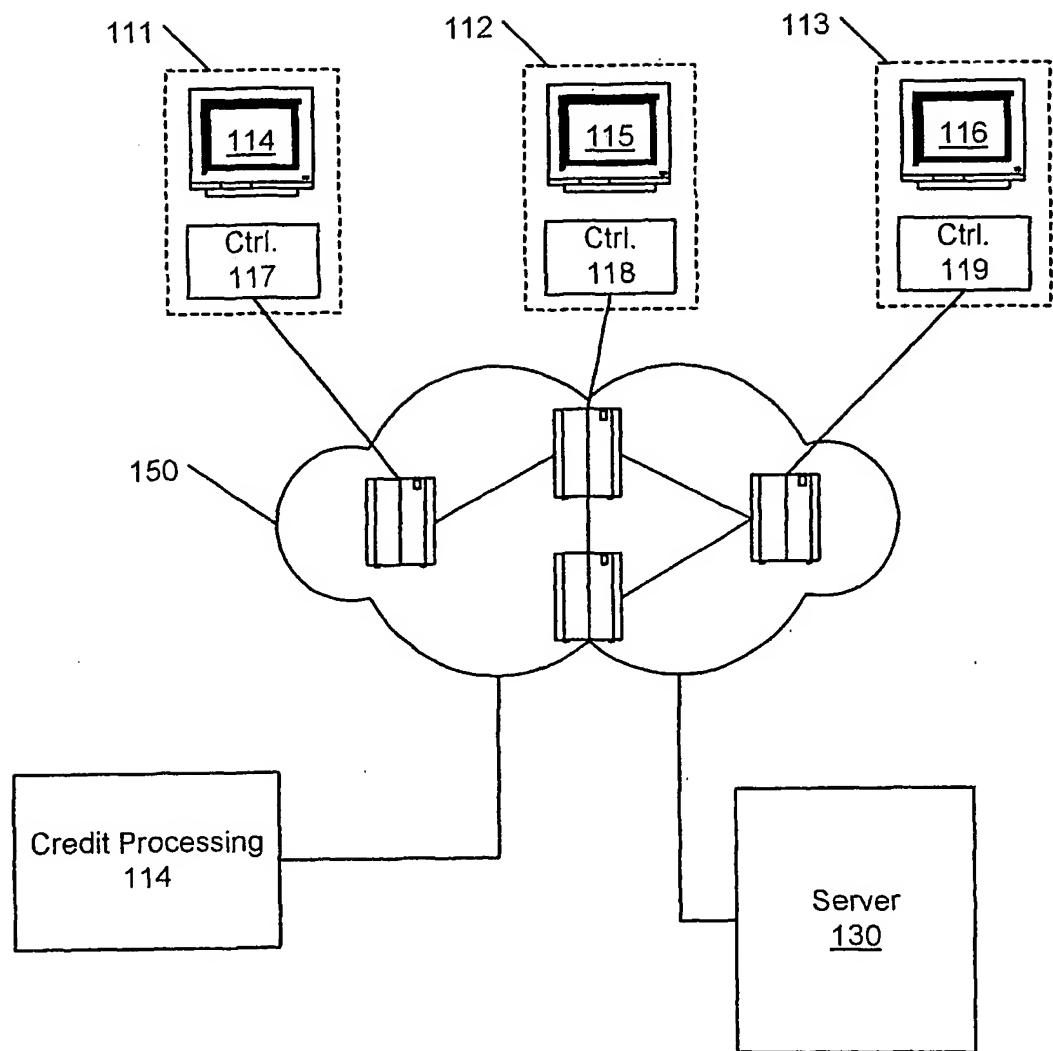
100

Fig. 1

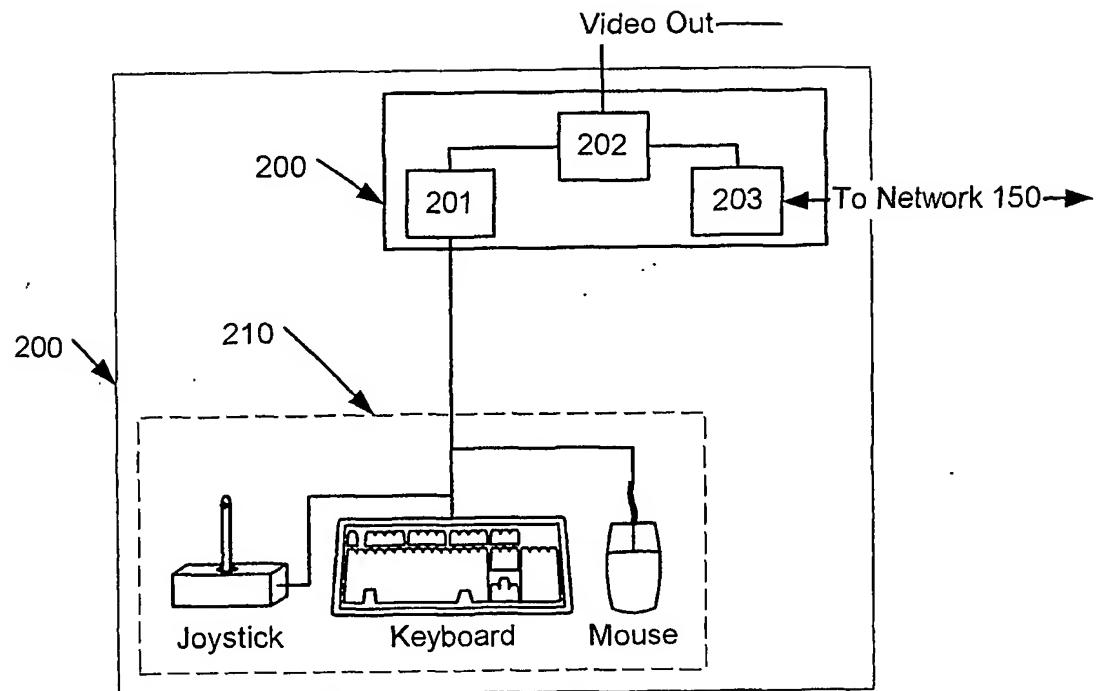


Fig. 2

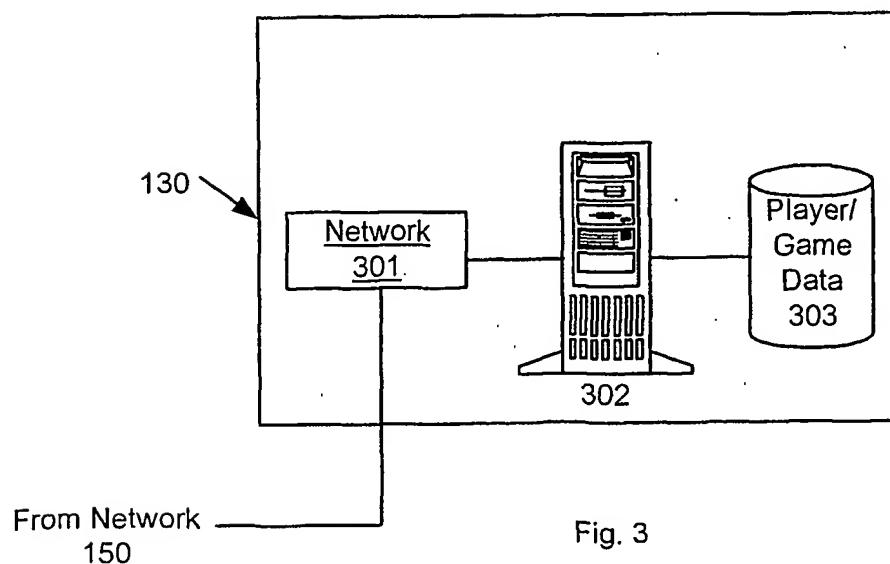


Fig. 3

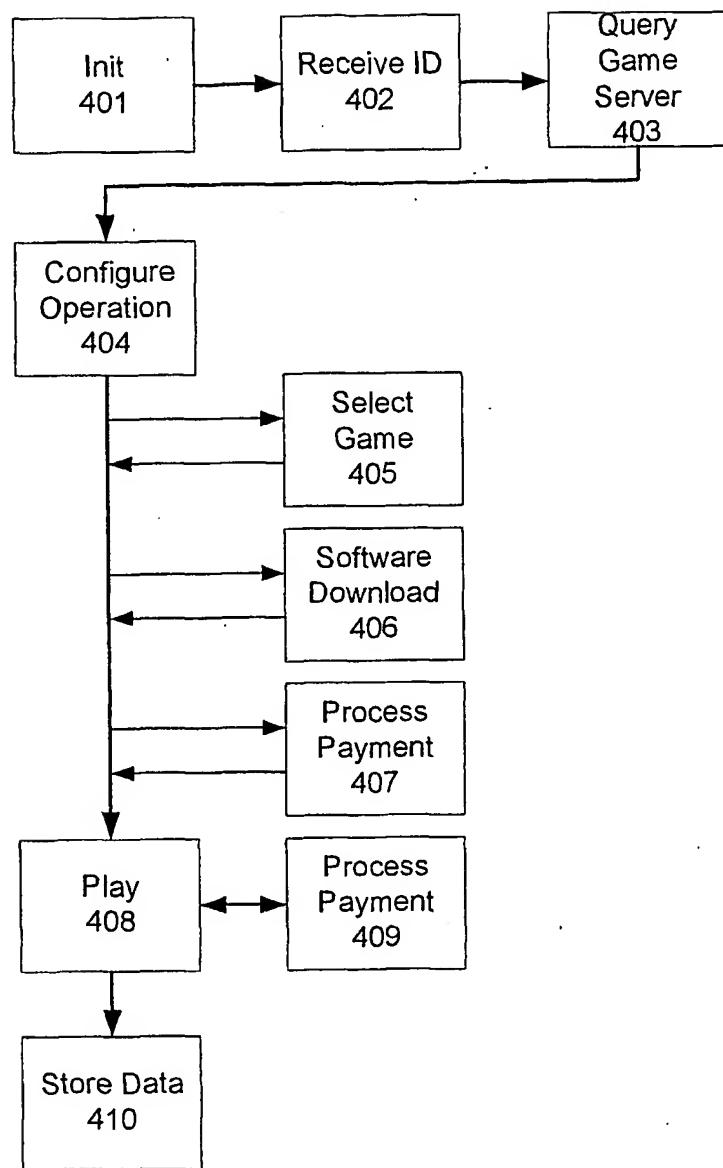


Fig. 4A

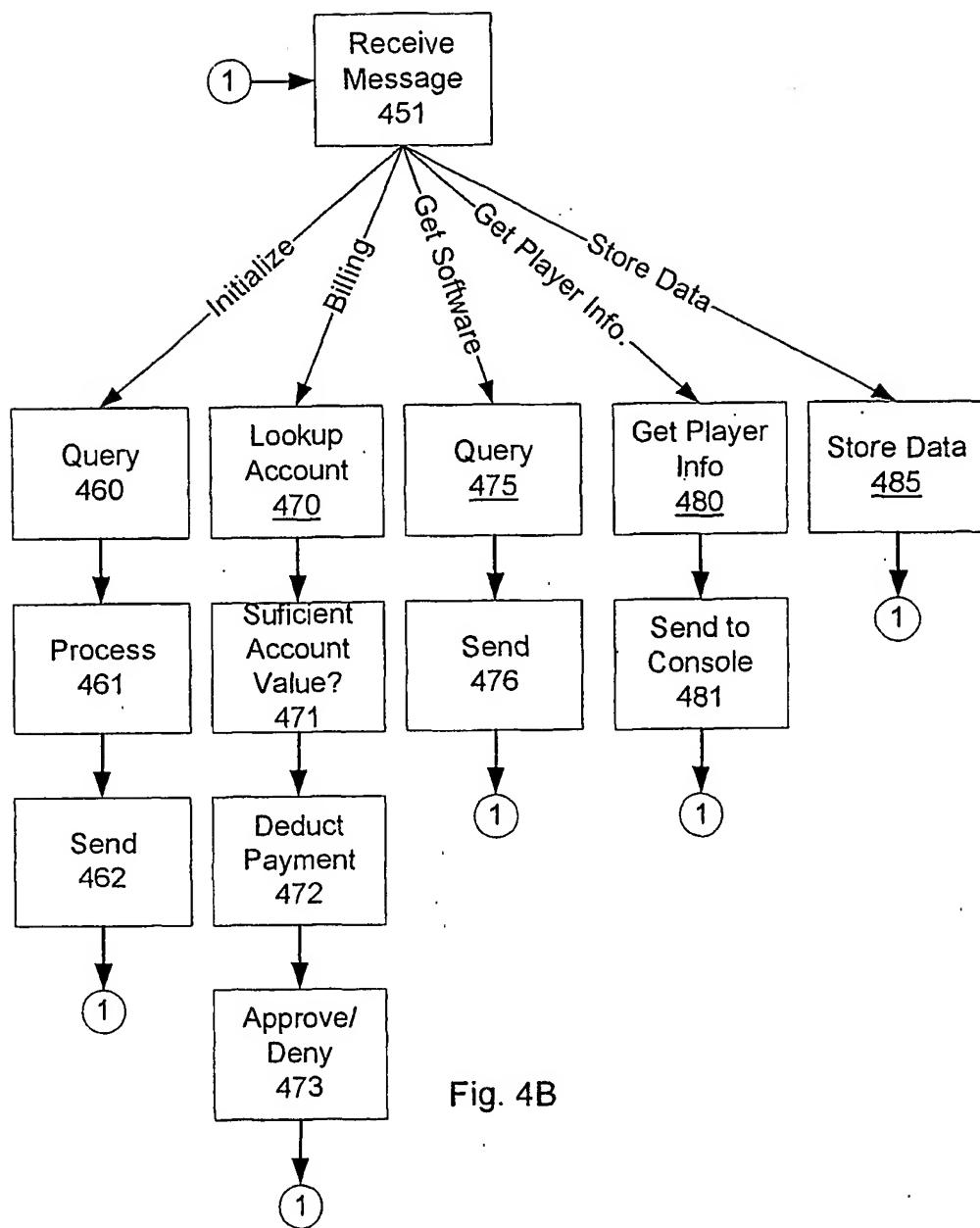


Fig. 4B

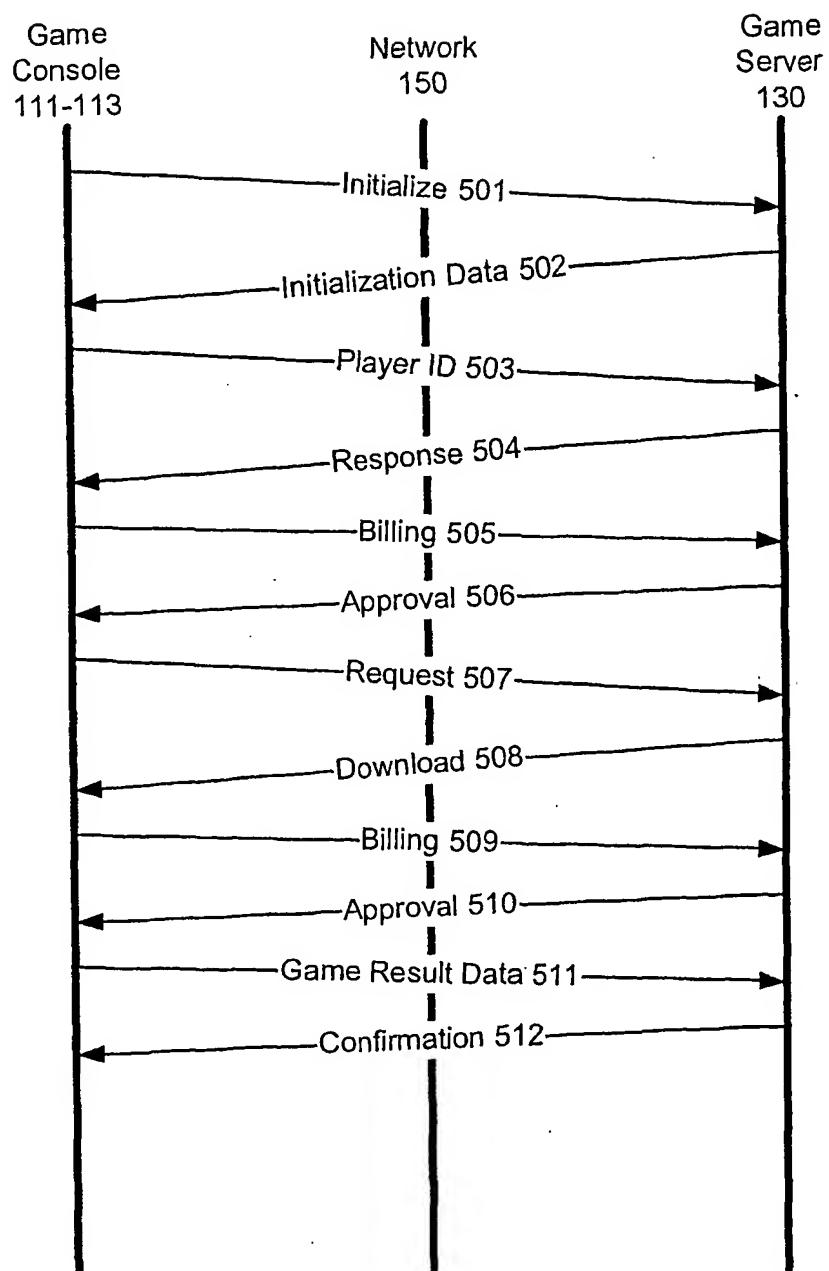


Fig. 5

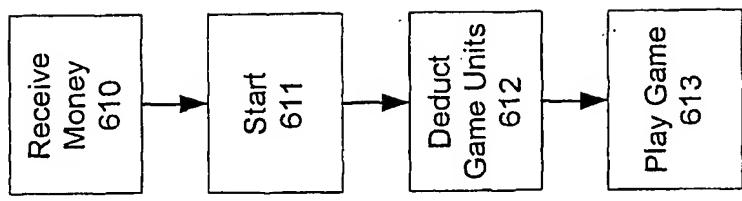


Fig. 6B

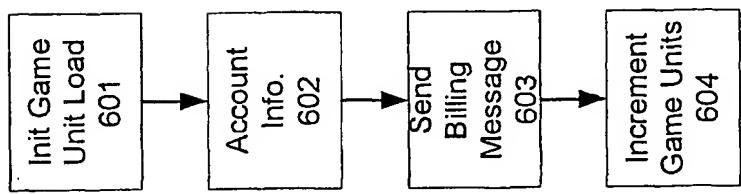


Fig. 6A